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REMARKS

The Office Action mailed September 4, 2003, has been carefully reviewed and by this Amendment, claims 1-7 have been canceled and new claims 8-27 have been added. Accordingly, claims 8-27 are pending in the application. In view of the new claims and the following remarks, favorable consideration and allowance of this application is respectfully requested.

The Examiner objected to the drawings as containing various informalities which Applicant has corrected herein. With respect to drawing changes, the line representing the chamber A has been modified to indicate the chamber area, and the surface layer 50 has been cross-hatched. As for the other objections, the phrase "space which is filled completely by the layer 50" on page 5, line 20, has been amended for clarification and, furthermore, 37 C.F.R. 1.83(a) requires that the drawings depict every feature of the invention specified in the claims; the "space" is not set forth in the new claims. Similarly, the disclosed embodiment described on page 6, lines 5-25, does not have to be shown in the drawings as it is not set forth specifically in the claims.

The "means (8)" in the abstract has been deleted as an error, and the phrase "liquid storage" does not appear in the new

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claims. Finally, reference character "40" has been omitted as redundant with reference numeral "4".

In regard to the relationship between reference numerals "12" and "50", in some sense both of these have reference to the surface of the shaft, but the structure being identified is not identical. The surface 12 of the shaft refers to the outer tangible portion of the shaft, while "50" specifically identifies the material layer, the tombak sleeve 50, which constitutes the outer surface 12. Thus reconsideration, also taking into account the amendments to the specification made herein, is requested.

The Examiner objected to the specification as containing informalities which Applicant has corrected. The objections designated by the letters "a" through "d" have been addressed through amendment of the specification. The text added to pages 1 and 2 corresponds with the claim text which was originally referenced and therefore does not constitute new matter.

With respect to the objections designated by the letters "e" through "g", amendments have been made and, in addition, Applicant provides the following explanation for further clarification.

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Chamber A is a hydraulic chamber. Upon pressurization thereof, one wall of the chamber, which defines the position of one of the frictional engagement walls of the coupling between the shaft and the sleeve, will deflect so as to bring the coupling to a preset friction engagement state having a certain torque value. Chamber A and the components of its filling system (not shown in the drawings) are separate from and not connected to the pump circuit with pumps 3 and oil channels 4, 41 described at page 5, lines 4-9 and 14-18. Furthermore, as clarified in the amended specification, the oil loop described on page 5, lines 4-9 is the same as that further described on page 5, lines 15-18.

The objections designated by the letters "h" and "i" and "o" have been corrected.

With respect to objection "j", the layer 50 essentially fills the space between the shaft 10 and the sleeve 20, with the notable exception of the grooves 51 in the layer 50. Furthermore, as is understood by persons of ordinary skill in the art, given the elasticity of most materials, if oil is pumped to the interface B at a sufficient pressure, one of the walls defining the interface B, i.e., one of the surfaces 12, 22, will deflect and permit a thin oil layer to extend.

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Objection "k" takes issue with the phrase which begins, "The net volume ..." on page 5, lines 29-32. This phrase refers to the overall volume of the tombak layer 50 when the sleeve and the shaft have been relieved of load in the radial direction such that the available space between the sleeve and shaft is reduced. This space reduction is accommodated by the nature of the tombak layer 50. For example, if the tombak layer is in the form of a foam layer, or has grooves in one of its main support surfaces, the net volume of the layer will be reduced if the layer is subjected to plastic deformation or becomes molten. (This can be visualized when considering a foam cup which, while bulky in its usable state, shrinks to a fraction of that size when heated.) As a result, the engagement between the frictional surfaces is lost when the effective thickness of the tombak layer 50 is reduced.

Objections "l" and "m" have been addressed through amendment of the specification to clarify that "plasticization" and "melting" are not synonymous terms. As defined in Websters Collegiate Dictionary, 10th Edition, "plasticize" means "to make plastic", and "plastic" means various things including pliable, or capable of being molded or of adapting to varying conditions. This is clearly not the same as "melting", which refers to the alteration of a material from a solid to a liquid. The surface

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layer 50 of the present invention is intended to provide deformability in the event of malfunction of the pump arrangement, whether due to jamming from age or lack of oil, etc. This deformation may be limited to plasticization, i.e., deformation, but, should the friction between the surfaces 12, 22 continue without relief, the surface layer 50 may ultimately become molten. Applicant regrets any ambiguity that existed in the original text.

As just noted above and in further response to objections "n" and "p", Applicant refers to the basis of the present invention, namely Applicant's international application WO 90/00231, which corresponds with U.S. Patent No. 5,069,320. A coupling of the kind disclosed in the '320 patent comprises two coaxial parts which engage by friction via cylindrical surfaces in a clutch-type arrangement. When the torque transmitted exceeds a certain preset value, a slip occurs between the parts at these cylindrical surfaces. As the frictional heat which is thus developed will soon destroy the slipping surfaces, the coupling is equipped with oil pumps (see Figure 2 of the '320 patent) which are connected between the coupling parts so that the pumps begin to pump when a relative rotation occurs between the parts. The pumps have access to an oil supply and, in

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operation, pump out oil through channels which open out to the interface between the frictional surfaces. The coupling parts normally consist of steel which can withstand a relative rotation of up to about 720°. During this rotation, the pumps are designed to come into operation and, by introducing oil between the slipping surfaces, reduce the friction to virtually zero.

A significant problem often occurs, however, particularly when a long time has elapsed between the initial installation of the clutch mechanism and the release thereof due to excess torque. Namely, upon slippage of the coupling, the oil which the pumps are supposed to pump in many cases will have leaked away or the pumps may have become inoperable for any reason, such as by jamming due to evaporation of volatile oil components. Thus, when the coupling slips, there is nothing to reduce the frictional heat which can result in a total welding of the steel coupling parts and destruction of the associated driving and driven equipment.

The present invention provides an added feature to the design shown in the '320 patent to avoid this catastrophic damage. According to the present invention, one of the coupling surfaces is established by a brass layer, i.e., a tombak sleeve 50. If and when the coupling between the sleeve and the shaft releases, the pumps 3 are intended to provide the necessary oil

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lubrication at the interface B between the surfaces 12, 22. However, in the event that the pumps have become inoperable or the oil to be pumped has leaked out, the coupling surfaces will not be destroyed. Instead, the brass sleeve will readily be plasticized and may possibly melt, thereby permitting the coupling parts to rotate, even if no oil, or an insufficient amount of oil, has been introduced in the interface B within the first two relative revolutions for the coupling parts 10, 20. In this way, the basic structure of the coupling will remain intact, requiring only that a new brass sleeve be substituted for the old one (which has been plasticized to some degree or possibly even been converted into a molten phase). At this time, of course, the pump operation and pump oil should also be checked and corrected.

Based on the foregoing explanation of the invention as disclosed, in combination with clarifications made to the specification, the objections "n" and "p" have been overcome. In the event of excess torque, power transmission between the shaft 10 and the sleeve 20 will be limited, either by the intended lubricating operation of the pumps 3 or, should the pumps malfunction due to old age jamming, lack of oil, etc., by the plasticization of the layer 50.

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The additional informalities noted in the specification have been corrected and, in so doing, no new matter has been added. The previous reference to WO 90/00231 has been replaced with a reference to the corresponding U.S. Patent No. 5,069,320, as already fully discussed herein; the matter incorporated by reference to U.S. Patent No. 5,069,320 consists of the same material previously incorporated in the present application by reference to WO 90/00231. Again, no new matter has been added.

Informalities in the abstract have also been corrected, with a replacement abstract being submitted herewith on a separate sheet.

The Examiner objected to the specification as not providing proper antecedent basis for the claims, objected to the claims as containing informalities, and rejected claims 1-7 under 35 U.S.C. 112, first and second paragraphs, as not complying with the enablement requirement and as being indefinite, respectively.

Applicant has canceled claims 1-7 and presented new claims 8-27 which are supported by the specification as required by 35 U.S.C. 112, first paragraph, and which are in conformity with 35 U.S.C. 112, second paragraph. Favorable consideration thereof, taking into account the foregoing explanations as well as the following remarks, is requested.

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As already explained above, the present invention is based upon the coupling disclosed in the '320 patent, which patent has been incorporated by reference as corresponding to the previously incorporated international application (WO 90/00231). Accordingly, discussion of the pump mechanism is not repeated herein, being already fully set forth in the '320 patent. Furthermore, upon slippage of the coupling due to excess torque, should the pump mechanism work effectively as intended, the channels 41 provided for carrying away the oil pumped to the interface B serve to enable frictional grip to be restored. However, in the event of a pump system malfunction resulting in friction between the coacting parts and deformation of the layer 50, the coupling may be disassembled and the tombak sleeve 50 replaced, as described in the specification.

There being no prior art rejection of the claims, with the amendments and the claims set forth herein, the application is in condition for allowance.

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Should the Examiner have any questions or comments, the Examiner is cordially invited to telephone the undersigned attorney so that the present application can receive an early Notice of Allowance.

Respectfully submitted,

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